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## Radiogenic cerebellar malformation: elicitation of behavioral transients to unmask compensated deficits of operant learning in rats.

Hicks (1953) demonstrated that neonatal irradiation produces selective cerebellar deformation in rats and proposed it as method for study of subsequent functional deficits. While such animals show reduced activity and motor skill, defects tend to compensate and no impairment has heretofore been found in learning. We hypothesized that malformed cerebellum impairs regulation, not acquisiton, of conditioned behavior. We sought abnormalities in the transient phase of adjustment by operant "timing" behavior to reinforcement schedule change, rather than in steady-state performance. Using as probes step, ramp and impulse-like changes of "demand" in delayed conditioned approach (*Canad. J. Psychol., 22,* 1968, 229-243), and comparing performance of 200 rad $^{60}Co$ exposed rats, irradiated at 2-3 days, with litter-mate controls at 60-120 days, rapidity of response latency adjustment following schedule perturbation and number of "premature" responses were examined. Superfluous "bursts" of bar presses were typical of irradiated animals when a time gap was inserted between CS and reinforcement on ($S_D$), although their performance was normal when CS and $S_D$ coincided. Latency was not adjusted by nonreinforcement of premature responses as in controls, although it could be prolonged if forced by "penalty" (DRL). An interpretation is offered in terms of a motor agnosia. Histological material shows cell depletion and anatomical disarrangement especially in cerebellum. Preliminary neurochemical results indicate 15-28% decrease in brain norepinephrine in radiateds with possible differences between cerebellar and cortical fractions (Supported by Medical Research Council of Canada Grant MA 3412 and Defense Research Board Grant 9310-118.)